a coding circuit generating reception light intensity information of a primary station based on result of the judgement by said decoding circuit and result of the judgement by said reception light intensity level judgement circuit and coding transmission data and said reception light intensity information;

an optical transmission circuit converting the reception light intensity information and the transmission data coded by said coding circuit to an optical signal;

an optical fiber connected to said optical transmission circuit; and

an optical fiber connected to said optical reception circuit.

REMARKS

Applicants appreciate the Examiner's thorough examination of the subject application and request reconsideration of the subject application based on the foregoing amendments and the following remarks.

Claims 1-21 are pending in the subject application, of which claim 13 is allowed. Claims 1-12 and 14-21 stand rejected under 35 U.S.C. §103.

Claims 1-2, 5-6, 8, 17-19 and 21 were canceled in the instant amendment without prejudice to prosecuting them in a continuing application. Claims 3, 4, 7, 9 and 10 were re-written in the foregoing amendment so each is in independent form. The amendments to the claims are supported by the originally filed disclosure.

Included herewith is a marked-up version of the amendments to the subject application by the current amendment. The marked-up versions are found on the

pages captioned or entitled "Details of Amendments" that follow the signature page of the within Response.

35 U.S.C. §103 REJECTIONS

Claims 1-12 and 14-21 stand rejected under 35 U.S.C. § 103 as being unpatentable over the cited prior art for the reasons provided on pages 2-6 of the above-referenced Office Action. Because claims 1-2, 5-6, 8, 17-19 and 21 were canceled in the foregoing amendment, the following is limited to addressing the within rejection as to the remaining claims, claims 3-4, 7, 9-12, 14-16 and 20. Because claims were amended in the foregoing amendment, the following discussion refers to the language of the amended claims, however, because these amendments comprise re-writing dependent claims in independent form, the amendments are not considered as being made to overcome the prior art reference(s). The following addresses the rejections provided in the above-referenced Office Action as to the following claims and/or groups of claims.

CLAIM 3

Claim 3 stands rejected as being unpatentable over Palmer [USP 6,285,481] in view of Batey [USP 6,104,512] for the reasons provided on page(s) 2-5 of the above referenced Office Action. Applicants respectfully traverse as discussed below. As also indicated above, claim 3 was rewritten so as to be in independent form. Applicants also respectfully disagree with the characterizations in the Office Action of the disclosures of both of Palmer and Batey.

Applicant claims, claim 3, a digital optical communication device that includes an optical reception circuit, a decoding circuit, a reception light intensity level judgment circuit, a coding circuit and an optical transmission circuit. The optical reception circuit converts an optical signal received from any external source to an electric signal and the decoding circuit decodes the electric signal resultant from conversion by the optical reception circuit and also judges whether or not the decoding is normally completed. The reception light intensity level judgment circuit judges an intensity level of received light based on the electric signal resultant from conversion by the optical reception circuit and the coding circuit codes transmission data.

The optical transmission circuit determines a light emission intensity based on the result of the judgment by the reception light intensity level judgment circuit and the result of the judgment by the decoding circuit. The optical transmission circuit also converts the transmission data coded by the coding circuit to an optical signal with the light emission intensity. Also, the optical transmission circuit determines the light emission intensity by referring to the intensity level judged by the reception light intensity level judgment circuit if the decoding circuit judges that the decoding is normally completed, and the optical transmission circuit determines the light emission intensity without referring to the intensity level judged by the reception light intensity level judgment circuit if the decoding circuit judges that the decoding is not normally completed.

According to the technique disclosed in Batey, the light emission intensity (power level) is increased until normal decoding is achieved to receive ACK. Batey

uses ACK for control of the light emission intensity. In contrast, according to the technique of the present invention the light emission intensity can be controlled without using ACK. In this respect, Batey and the present application fundamentally differ from each other in the concept supporting the means for achieving the object.

In order to control the light emission intensity according to the magnitude of the intensity of received light without using ACK, it is important to determine whether the intensity of the received light is the intensity of the signal itself or whether the intensity is influenced by noise. For example, if the intensity of the received light is high, the received light intensity of the signal itself could be low due to great noise of sunlight or fluorescent light for example [low signal to noise ratio (SNR)]. In this case, if the light emission intensity is decreased for the reason that the intensity of the received light is high, the SNR is further decreased to hinder or prevent communication. According to claim 3 of the present application, if the intensity of the received light is high but considerably influenced by noise, the light emission intensity is increased regardless of the magnitude of the intensity of the received light in order to make communication possible.

Batey also does not disclose, teach or suggest anywhere that the determination of the light emission intensity is determined one way if the decoding circuit determines if the decoding is complete and is determined another way if the decoding circuit determines if the decoding is not complete. As indicated herein, Batey describes the use of a number of iterative techniques for adjusting the intensity level and none of these techniques describe a methodology that differentiates between when decoding is completed or not completed.

Further, Batey does not determine a light emission intensity based on a result of judging circuit. Rather in Batey an iterative procedure is implemented whereby the control circuitry increases or decrease the transmission power levels until it is found that a connection has been successfully established or maintained or until it is determined that no connection has been established even at max power. In other words, Batey just keeps trying different power levels in an iterative fashion without judging at any time what the power level or light emission intensity should be.

As to Palmer, Palmer does not disclose, teach of suggest anywhere that the determination of the light emission intensity is determined one way if the decoding circuit determines if the decoding is complete and is determined another way if the decoding circuit determines if the decoding is not complete. All that Palmer describes and teaches is an automatic gain control systemology for adjusting the intensity of the transmission optical signal as herein described.

Also, Palmer describes a free-space laser communications error control system, more specifically a free-space atmospheric laser communications error control system. As indicated in Palmer, free-space atmospheric laser communication systems transmit and receive information by means of a light beam that propagates through the atmosphere. When used for air-to-air or air-to-ground communications, such systems pose a number of challenging problems. One such problem is that over long distances, or over short distances through a turbulent atmosphere, the beam is absorbed, diffracted and refracted, causing such problems as scintillation in the receiver. What the receiver sees is a "twinkling", like light from a star, where the beam can actually disappear and reappear in a millisecond. The disappearance of the

beam is called a "dropout" and such dropouts can disrupt normal communications if not controlled. Another form of disruption is attenuation of the beam due to absorption in haze, mist, fog, snow or other weather phenomenon. During such conditions, it is not uncommon to have the signal go from full-amplitude to nothing every few seconds (See col. 1, lines 5-30 thereof).

As Palmer further indicates, the effect on communications of this "channel property" takes two forms: data can be lost and/or data can be corrupted. This is a problem for interfacing a free-space atmospheric laser communication system with modern network systems, which are designed to operate with a fast, reliable, low-error transport media (the physical layer). Accordingly Palmer indicates that it is important to try to minimize or eliminate dropouts and to attain very low bit-error-rates (see col. 1, lines 31-39).

As to the control circuit comprising the invention in Palmer, Palmer provides that the circuit circumvents the problems of scintillation and other atmosphere-induced degradation of signal propagation in a free-space atmospheric laser communication system by transmitting a "signal strength" data stream between each pair of communicating laser transceivers. The signal strength data stream indicates the signal strength of the sending transceiver as actually received by the remote receiving transceiver. If the sending transceiver receives the signal strength data from the remote receiving transceiver indicating that the signal strength of the sending transceiver has fallen to or below a selected threshold, or if the sending transceiver cannot detect the signal strength data stream, then the sending transceiver suspends transmission of information packets (See col. 1, lines 41-55, Figure 3 and col. 4, lines

33-42). Palmer further indicates (e.g., see Figure 3 thereof and col. 3, lines 26-30) that the signal strength data stream from the remote transceiver is monitored on a periodic and a continuing basis by a first control look algorithm including the above checks on the signal strength and the data stream.

As to what occurs following suspension of information packets, Palmer provides that "After any suspension of transmission of information packets, the signal strength data stream from the remote transceiver is monitored on a periodic but continuing basis by a second control loop algorithm. As noted previously, when transmission of information packets is suspended, the communicating transceivers still attempt to send and to monitor the signal strength data stream." (See col. 4, lines 43-49). As to the periodicity, Palmer provides that it has been found that the effects of scintillation essentially do not change more rapidly than about 1 KHz. Thus, in the preferred embodiment in Palmer each transceiver samples the received signal strength data stream transmitted by the remote transceiver at a sufficiently high rate to properly forward predict the signal strength. In the preferred embodiment, the signal strength data stream date rate and the receiver sampling frequency are about 10 KHz.

When it is determined that the signal strength has returned to an intensity level above the selected threshold, the sending transceiver resumes transmission of information packets. Palmer asserts that this technique prevents transmitting errors during periods of dropouts or low signal level due to scintillation or other causes. Palmer emphasizes a number of times therein that at all times, the laser communication system continues to transmit the signal strength data stream between the transceivers even though information packets are not transmitted.

In the above-referenced Office Action, it is asserted that it would have been obvious to one skilled in the art to modify the control circuit in Palmer based on the teachings of Palmer, knowledge known to those skilled in the art and/ or the teachings of Batey, such that the so-modified control circuit of Palmer judges whether or not decoding is normally completed and as result of the judgment by said decoding circuit adjusting the optical transmission circuit light intensity in order to avoid loss of data and to determine when it is necessary to re-transmit data. This assertion is completely at odds with the teachings and disclosures of Palmer as to the purpose, function and operation of the control circuit disclosed therein. In fact, the suggested modification would lead to the occurrence of signal problems that the circuit in Palmer is intended to avoid.

As indicated above, Palmer recognizes that the atmosphere the laser beam is traveling through can disrupt the laser beam between the transceivers, which disruption is not avoidable. As such, the circuitry in Palmer is designed to periodically and continuously transmit a signal strength data stream therebetween. Stated another way, Palmer is outputting a periodic and continuous signal strength data stream to determine when a signal disruption has occurred to interrupt transmission of information packets when the disruptions occurs.

In sum, Palmer and Batey, alone or in combination, do not disclose, teach or suggest, either explicitly or inherently, the digital optical communication device as set forth in claim 3. As such, claim 3 is considered to be distinguishable from the cited combination of references.

CLAIMS 4, 7, 10, 14 & 16

Claims 4, 7, 10, 14 and 16 stand rejected as being unpatentable over Palmer in view of Batey and further in view of Minteer [USP 6,188, 494"] for the reasons provided on pages 5-6 of the above referenced Office Action. Applicants respectfully traverse.

Each of claims 4, 7, 10, 14 and 16 claim a digital optical communication device including as limitations thereof that an optical fiber is connected to the optical transmission circuit and that an optical fiber is connected to the optical reception circuit.

Communication by means of the optical fiber (wired communication) and infrared communication in space (wireless communication) as taught by Palmer completely differ from each other in terms of technique. As indicated by the Examiner, the optical fiber communication can avoid external interference from sun or fluorescent light while having a disadvantage that the system loses flexibility. The wired communication and wireless communication are fundamentally different from each other. The wired communication, by means of the optical fiber for example, is advantageous in that a remarkably high-quality communication for a long distance is possible because there is no external interference like that from sunlight. On the other hand, wired communication by the optical fiber for example has a disadvantage of lack of system flexibility. Also, wireless communication like infrared communication using space is advantageous in that the system is highly flexible, however, it is disadvantageous in that it is subjected to external interference from sunlight for example.

The present invention discloses a technique that addresses the fundamental problem of external interference occurring when the wireless communication is used that provides a high system flexibility (which cannot be achieved by such wired communication by means of the optical fiber). Accordingly, it is absolutely improper to compare Minteer disclosing the technique concerning the optical fiber with the present application, since the basic theory about communication is being ignored.

It is respectfully submitted that claims 4, 7, 10, 14 and 16 are patentable over the cited reference(s) for the foregoing reasons.

CLAIM 9

Claim 9 stands rejected as being unpatentable over Palmer [USP 6,285,481] in view of Batey [USP 6,104,512] for the reasons provided on page(s) 2-5 of the above referenced Office Action. Applicants respectfully traverse as discussed below. As also indicated above claim 9 was rewritten so as to be in independent form.

According to the technique disclosed in Palmer, information about the intensity of received light of one station is transmitted to the other station, while no signal is transmitted indicating that reception has normally been completed (reception normal completion signal). For the other station, the information about intensity and the information of the reception normal completion signal have different important meanings.

Specifically, the other station receiving only the information about the intensity of received light cannot determine if the information is accurate or not, because the receiving sensitivity is different depending on receivers. If the intensity of received

light is sufficient for decoding for one receiver, it is frequent that the intensity is insufficient for the other receiver. In this case, not only the information about the intensity of received light but also the reception normal completion signal is transmitted from one station to the other station in order to allow the other station to be informed of the relation between the intensity of the received light and whether or not reception is possible. According to the present application, the information of the reception normal completion signal is transmitted together with the information about the intensity of received light from one station to the other station so that a system can be designed in consideration of the difference in receiving sensitivity between receivers, while such a system design is impossible by Palmer.

It is respectfully submitted that claim 9 is patentable over the cited reference(s) at least for the foregoing reasons.

CLAIMS 11, 15 & 20

Claims 11, 15 and 20 stand rejected as being unpatentable over Palmer [USP 6,285,481] in view of Batey [USP 6,104,512] for the reasons provided on page(s) 2-5 of the above referenced Office Action. Applicants respectfully traverse as discussed below.

According to the "handshaking" protocol as taught by Batey, the light emission intensity requests are not exchanged. Thus, the "handshaking" protocol differs from the technique as claimed by Applicants.

It is respectfully submitted that claims 11, 15 and 20 are patentable over the cited reference(s) at least for the foregoing reasons.

CLAIM 12

Claim 12 stands rejected as being unpatentable over Palmer [USP 6,285,481] in view of Batey [USP 6,104,512] for the reasons provided on page(s) 2-5 of the above referenced Office Action. Applicants respectfully traverse as discussed below.

Batey teaches that the start flag and the stop flag are detected for controlling the light emission intensity, however, such detection is normally performed for using BER, because BER is used for determining if data between the start flag and the stop flag is correct or not. On the other hand, the light emission intensity is controllable by using only the intensity of received light without BER and, in this case, no start flag and stop flag is necessary because the intensity can be observed regardless of these flags. However, a high intensity of received light that is observed before the start flag does not help or contribute to communication. Then, if the intensity of received light is used instead of BER for control of the light emission intensity, it is important to recognize the start flag and the stop flag, as disclosed in the present application.

It is respectfully submitted that claim 12 is patentable over the cited reference(s) at least for the foregoing reasons.

The following additional remarks shall apply to each of the above.

As provided by the Federal circuit, a 35 U.S.C. §103 rejection based upon a modification of a reference that destroys the intent, purpose or function of the invention disclosed in a reference, is not proper and the prima facie case of obviousness cannot be properly made. In short there would be no technological

motivation for engaging in the modification or change. To the contrary, there would be a disincentive. *In re Gordon,* 733 F. 2d 900, 221 USPQ 1125 (Fed. Cir. 1984). Moreover, if the proposed modification of combination of the prior art would change the principal of operation of the prior art invention been modified in the teachings of the references and a sufficient to render the claims *prima facie* obvious. *In re Ratti,* 270 F. 2d 810, 123 USPQ 349 (CCPA 1959). See also MPEP 2143.01. Applicants respectfully submit that the modifications suggested in the above-referenced Office Action to the principal reference, Palmer, would yield a digital optical communication device that would be totally incapable of performing the intended purpose or function of the invention as described in Palmer as well as changing the principal of operation of the communication device control circuit being described in Palmer.

As provided in MPEP 2143.01, obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so <u>found</u> either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *In re Fine,* 837 F. 2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones,* 958 F. 2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). As provided above, the references cited, alone or in combination, include no such teaching, suggestion or motivation. Further, when the teachings of Palmer and Batey are considered in their entirety, it can hardly be said that these shortcomings can be overcome by reference to knowledge of those skilled in the art.

Furthermore, and as provided in MPEP 2143.02, a prior art reference can be combined or modified to reject claims as obvious <u>as long as</u> there is a reasonable

expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 19866). Additionally, it also has been held that if the proposed modification or combination would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. Further, and as provided in MPEP-2143, the teaching or suggestion to make the claimed combination and the reasonable suggestion of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). As can be seen from the forgoing discussion regarding the disclosures of the cited references, there is no reasonable expectation of success provided in any reference as to the suggested modification to the principal reference, Palmer. Also, it is clear from the foregoing discussion that the modification suggested by the Examiner would change the principle of operation of the control circuit disclosed in Palmer. Although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." *In re Mills*, 916 F. 2d, 680, 682; 16 USPQ 2d 1430, 1432 (Fed. Cir. 1990). See also *In re Fritch*, 972 F. 2d 1260, 23 USPQ 2d 1780 (Fed. Cir. 1992).

As the Federal circuit has stated, "[t]he mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." *In re Fritch*, 972 F.2d 1260,1266, 23 USPQ2d 1780, 1783-84 (Fed. Cir. 1992). Obviousness may not be established using hindsight or in view of the teachings or suggestions of

the inventor. *Para-Ordance Mfg. v. SGS Importers Int'l, Inc.*, 73 F.2d 1085, 1087, 37 USPQ2d 1237, 1239 (Fed. Cir. 1995

The Federal Circuit also has indicated that a prior art reference that gives only general guidance and is not all that specific as to particular forms of a claimed invention and how to achieve it, may make a certain approach obvious to try, but does not make the invention obvious. *Ex Parte Obukowicz*, 27 USPQ2d 1063, citing *In re O'Farrell*, 853 F.2d 894, 7 USPQ2d 1673,1-681 (Fed. Cir. 1988).

It is respectfully submitted that for the foregoing reasons, claims 1-12 and 14-21 are patentable over the cited reference(s) and, therefore, satisfy the requirements of 35 U.S.C. §103. As such, these claims are allowable.

It is respectfully submitted that the subject application is in a condition for allowance. Early and favorable action is requested.

Applicants believe that additional fees are not required for consideration of the within Response. However, if for any reason a fee is required, a fee paid is inadequate

or credit is owed for any excess fee paid, you are hereby authorized and requested to charge Deposit Account No. **04-1105**.

Respectfully submitted,
EDWARDS & ANGELL, LLP
DIKE, BRONSTEIN, ROBERTS & CUSHMAN
Intellectual Property Practice Group

Date: December 23, 2002

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DETAILS OF AMENDMENTS

Please amend the subject application as follows:

IN THE CLAIMS

Cancel claim(s) 1, 2, 5, 6, 8, 17-19 and 21 without prejudice.

Amend claim(s) 3, 4, 7, 9, and 10 to read as follows:

3. (AMENDED) ~~The~~A digital optical communication device comprising:~~according to claim 1,~~

an optical reception circuit converting an optical signal received from any external source to an electric signal;

a decoding circuit decoding the electric signal resultant from conversion by said optical reception circuit and judging whether or not the decoding is normally completed;

a reception light intensity level judgement circuit judging an intensity level of received light based on the electric signal resultant from conversion by said optical reception circuit;

a coding circuit coding transmission data;

an optical transmission circuit determining a light emission intensity based on result of the judgement by said reception light intensity level judgement circuit and result of the judgement by said decoding circuit and converting the transmission data coded by said coding circuit to an optical signal with the light emission intensity;

wherein said optical transmission circuit determines the light emission intensity by referring to the intensity level judged by said reception light intensity

level judgement circuit if said decoding circuit judges that the decoding is normally completed, and

wherein said optical transmission circuit determines the light emission intensity without referring to the intensity level judged by said reception light intensity level judgement circuit if said decoding circuit judges that the decoding is not normally completed.

4. (AMENDED) ~~The~~A digital optical communication device ~~according to claim 1, further~~ comprising:

an optical reception circuit converting an optical signal received from any external source to an electric signal;

a decoding circuit decoding the electric signal resultant from conversion by said optical reception circuit and judging whether or not the decoding is normally completed;

a reception light intensity level judgement circuit judging an intensity level of received light based on the electric signal resultant from conversion by said optical reception circuit;

a coding circuit coding transmission data;

an optical transmission circuit determining a light emission intensity based on result of the judgement by said reception light intensity level judgement circuit and result of the judgement by said decoding circuit and converting the transmission data coded by said coding circuit to an optical signal with the light emission intensity;

an optical fiber connected to said optical transmission circuit; and

an optical fiber connected to said optical reception circuit.

7. (AMENDED) ~~The~~A digital optical communication device ~~according to claim 5, further~~ comprising:

an optical reception circuit converting an optical signal received from any external source to an electric signal;

a decoding circuit decoding the electric signal resultant from conversion by said optical reception circuit, judging whether or not the decoding is normally completed, and extracting reception light intensity information of a secondary station;

a coding circuit coding transmission data;

an optical transmission circuit determining a light emission intensity based on the reception light intensity information of the secondary station extracted by said decoding circuit, and converting the transmission data coded by said coding circuit to an optical signal with the light emission intensity;

an optical fiber connected to said optical transmission circuit; and

an optical fiber connected to said optical reception circuit.

9. (AMENDED) ~~The~~A digital optical communication device comprising: ~~according to claim 8,~~

an optical reception circuit converting an optical signal received from any external source to an electric signal;

~~a decoding circuit decoding the electric signal resultant from conversion by said optical reception circuit and judging whether or not the decoding is normally completed;~~

~~a reception light intensity level judgement circuit judging an intensity level of received light based on the electric signal resultant from conversion by said optical reception circuit;~~

~~a coding circuit generating reception light intensity information of a primary station based on result of the judgement by said decoding circuit and result of the judgement by said reception light intensity level judgement circuit and coding transmission data and said reception light intensity information;~~

~~an optical transmission circuit converting the reception light intensity information and the transmission data coded by said coding circuit to an optical signal;~~

wherein said coding circuit encodes said transmission data, said reception light intensity information, and reception normal completion information judged by said decoding circuit, and

wherein said optical transmission circuit converts the transmission data, the reception light intensity information, and the reception normal completion information coded by said coding circuit to the optical signal.

10. (AMENDED) ~~The~~A digital optical communication device ~~according to claim 8, further~~ comprising:

an optical reception circuit converting an optical signal received from any external source to an electric signal;

a decoding circuit decoding the electric signal resultant from conversion by said optical reception circuit and judging whether or not the decoding is normally completed;

a reception light intensity level judgement circuit judging an intensity level of received light based on the electric signal resultant from conversion by said optical reception circuit;

a coding circuit generating reception light intensity information of a primary station based on result of the judgement by said decoding circuit and result of the judgement by said reception light intensity level judgement circuit and coding transmission data and said reception light intensity information;

an optical transmission circuit converting the reception light intensity information and the transmission data coded by said coding circuit to an optical signal;

an optical fiber connected to said optical transmission circuit; and

an optical fiber connected to said optical reception circuit.